

# COINCIDENT REMOVAL OF ADDITIONAL STRUCTURES IN RESECTIONS FOR CARCINOMA OF THE COLON AND RECTUM

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DURING RECENT YEARS a rising operability has been reported in carcinoma of the colon and rectum. There is little, if any, indication that this is the result of earlier diagnosis.<sup>5</sup> Rather, it appears to be due to augmented attempts at the removal of growths which previously were considered inoperable. Impulse for such increasing radicalism has been provided by a better understanding of the prevention and control of the several major complications which have attended these operations, primarily shock, infection, and embolism, and by developments in the field of anesthesia particularly the employment of the continuous principle in spinal anesthesia.<sup>3</sup>

Consequently, it is now not unusual for resections of the large bowel to be carried out with palliative intent alone or occasionally to be supplemented by subsequent removal of solitary or grossly localized hepatic metastases.<sup>2, 6</sup> More important, however, has been a trend<sup>1</sup> toward the removal of additional structures or organs adjacent to the primary tumor which are known or considered to be secondarily involved by it in an attempt at cure. A group of such cases forms the basis of the present report.

During the past few years 220 patients with colonic or rectal carcinomas have been seen at this hospital which accepts only indigent patients largely from rural areas.<sup>4</sup> Some idea of the relatively poorer condition of these patients on applying for treatment is evident, in that 86 per cent had lost weight and 67 per cent of these had lost more than 15 pounds. The average duration of symptoms was 18 months. Swinton, reporting from a private urban clinic, found that less than two-thirds of his cases had lost weight and fewer than 50 per cent of these had lost more than 15 pounds. The average duration of symptoms among his patients was nine months.

Specific treatment was not attempted in 31 of the 220 patients, 42 were explored with or without the formation of a colostomy, and resection was carried out in 147 cases, a resectability rate of 78 per cent of all those in whom exploration was considered to be justified, or 67 per cent of all patients seen. Of the first group in which no specific treatment was carried out three patients were resectable but refused operation, four presented extensive post-surgical recurrences, and five were admitted *in extremis* and died before supportive measures could become effective. Eighteen presented clinically obvious distant metastases. A single patient developed a coronary thrombosis while in the hospital and was refused operation on that basis.

Among the 42 patients explored distant intra-abdominal metastases were

found in 35, a large postsurgical recurrence was found in the pelvis of one, and six presented the combination of far-advanced local disease with marked general debility and were felt to be unsafe for anything but colostomy.

Of the 147 resections, 15 (10 per cent) were operated upon with palliative intent alone, and will, therefore, have no further part in the discussion. One hundred and thirty-two resections (90 per cent) were undertaken with hope of cure. Of these, 13 (10 per cent) were accomplished on patients previously explored at other hospitals, where they had been judged unsuitable for resec-

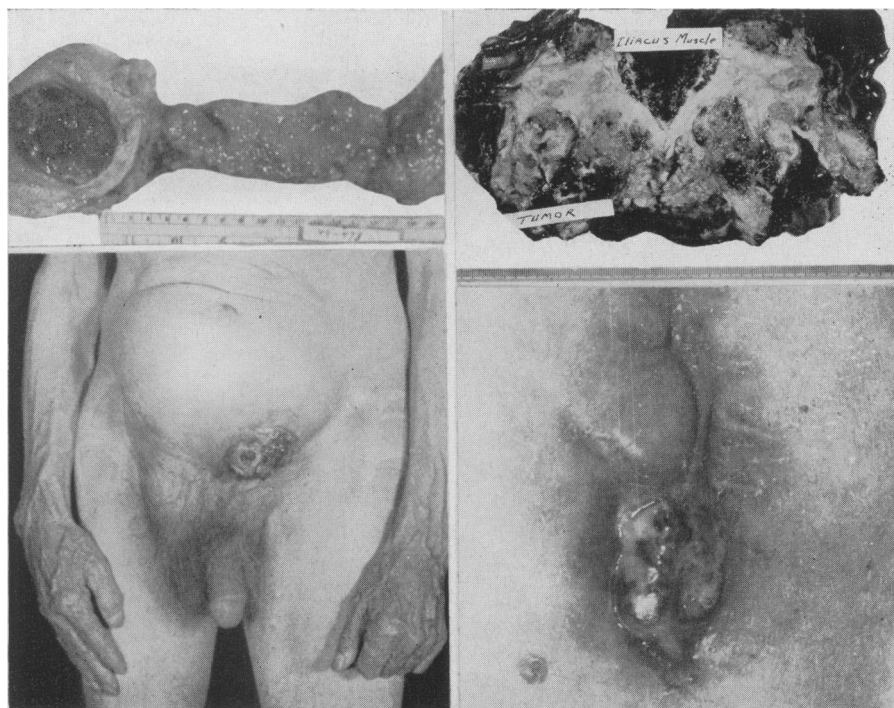


FIG. 1-A

FIG. 1-B

FIG. 1.—Abdominal wall involvement by carcinoma of the colon.

A. (Case 6192) : Carcinoma of the sigmoid treated two years previously (elsewhere) by Mikulicz resection—recurrent in the implanted bowel and invading the abdominal wall. Treated by Miles' resection in order to accomplish high inferior mesenteric node removal.

B. (Case 4921) : Carcinoma of cecum fungating through abdominal wall postappendectomy, densely adherent to iliacus muscle, removed with abdominal wall, femoral nerve (upper left corner) and iliacus muscle. Abdominal wall following closure consisted of skin lined by omentum.

tion. Excepting for the single above mentioned case with coronary thrombosis no patient was refused operation because of age (10 per cent over 75 years old), diabetes, heart or kidney disease, or general debility, nor was local advancement of the disease by itself a deterrent in any instance. With such a setting it becomes apparent that serious consideration has been given to offering each patient in whom it was not already precluded an opportunity for cure.

In adhering to this principle the removal of some other structure in addition to the bowel was considered necessary in 42 (32 per cent) of the patients



FIG. 2.—(Case 7298): Involvement of the retro-urethral portion of the prostate by an adjacent carcinoma of the lower rectal ampulla. Photomicrograph shows invasion of the prostate.

resected whose disease, though locally advanced, gave no clinical evidence of having spread beyond the limits of possible surgical removal.

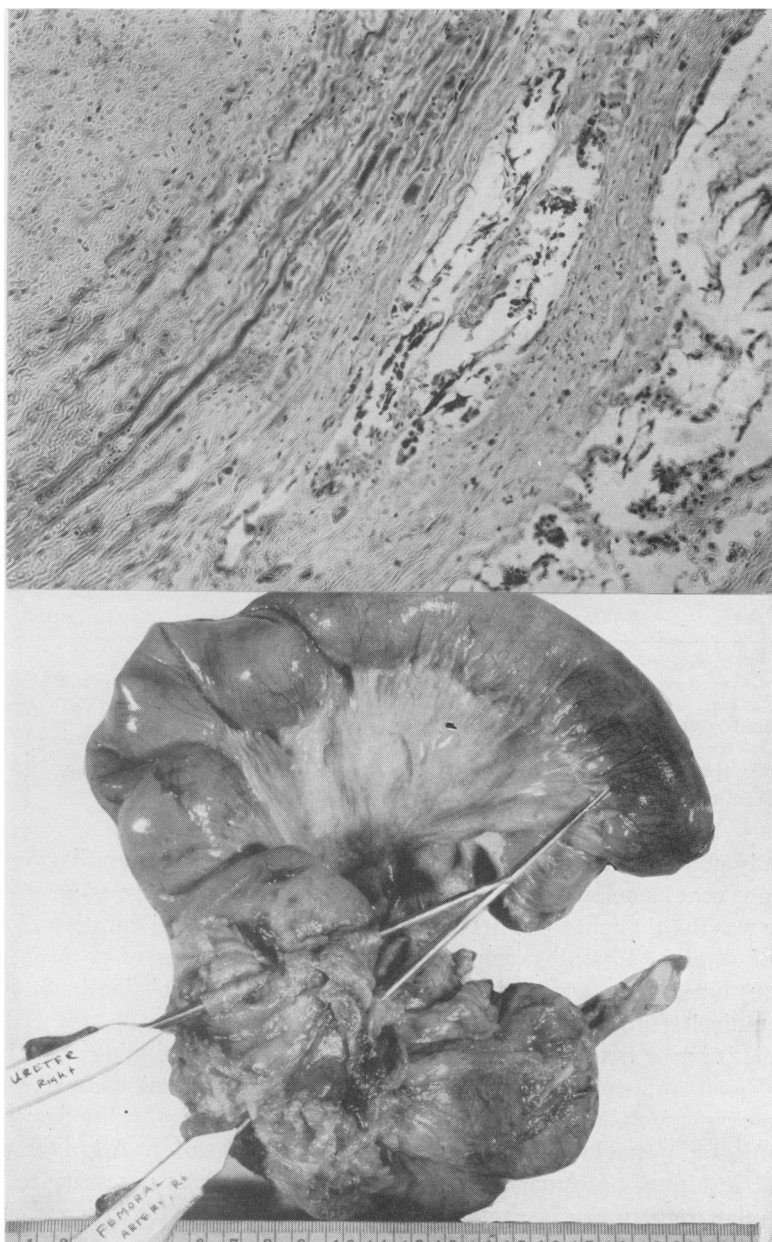


FIG. 3.—(Case 7223) : Removal of an adherent loop of ileum, and encircled segment of ureter, and similarly encircled segments of the external iliac vessels by a carcinoma of the rectosigmoid. Photomicrograph shows involvement of the wall of the external iliac artery.

The single indication for extending the resection in all cases was either known involvement of the structure adjacent to the bowel or such firm fixation to it that dissection between them was felt to entail too great a risk of entering disease. Under certain circumstances wide removal about a point of fixation will not be possible; for example, when invasion has taken place deeply into the lateral pelvic wall. All or part of a single structure was removed in 27 patients, of more than a single structure in 15 patients.

Though the average age of the more radically treated patients was somewhat less than that of those receiving resection of the bowel only, 56 and 61 years, respectively, the much higher incidence of weight loss among the former group, 93 and 68 per cent, respectively, would offer some index as to their

TABLE I

CLINICAL AND PATHOLOGIC COMPARISON OF PATIENTS HAVING RESECTIONS OF THE COLON OR RECTUM ALONE AND THOSE IN WHOM THE RESECTION WAS ATTENDED BY REMOVAL OF ADDITIONAL STRUCTURES

	Clinical			Pathologic*					
	Age	Duration Symptoms	Per Cent with Weight Loss	Opera- tive Mortal- ity	In- volve- ment to Serosa	Lym- phatic Involve- ment	Node Involve- ment (Clearing Method not Used)	Nerve in- volve- ment	Vein In- vasion
Resection of colon and rectum alone (74 pts.)	61 yrs.	13 mos.	68%	9%	79%	31%	22%	5%	18%
Resection of colon and rectum attended by removal of an additional structure	56 yrs.	15 mos.	93%	19%	95%†	51%	31%	12%	34%

\* Note: In 41% the sole ominous pathologic feature was involvement of all layers of the bowel.

† In 50% of cases there was actual extension of disease into the additional structure removed.

generally poorer condition and is in part responsible for an operative mortality of 19 per cent as compared to a mortality of 9 per cent where additional procedure was not thought to be necessary. An almost identical duration of symptoms of 15 and 13 months, respectively, in the two groups of patients would indicate that a more aggressive form of disease is the probable basis for the more radical treatment required.

This is borne out in a comparison of those pathologic findings well-known to adversely influence the prognosis in colonic and rectal cancer; namely, involvement of all layers of the bowel, invasion of neighboring lymphatics, vein invasion, nerve involvement and lymph node metastases. All of these were present in higher percentage in those cases where it was necessary to resect some other structure. It should be noted, however, that in 41 per cent no lymphatic or vein invasion, lymph node or nerve involvement was present, the sole ominous feature being involvement of all layers of the bowel wall (Table I). Furthermore, the same could be said of 9 out of 20 cases in which actual gross or microscopically demonstrable invasion of the adjacent structures had already taken place.



FIG. 4.—(Case 6686) : Uterus, tubes, ovaries and entire vagina removed with rectum for an extensive lesion of the latter—shown fungating through the posterior vaginal wall. Photomicrograph indicates the rectal carcinoma ulcerating through the stratified squamous epithelium of the vagina.

Actual involvement of the additional organs removed was demonstrated in 50 per cent of the specimens. It is highly probable that microscopic invasion would have been noted more often if multiple sections had been taken about the point of fixation where a single section failed to demonstrate it. Since involvement of all layers of the bowel was present in all but two cases it is very likely that dissection carried through the usual tissue planes would have resulted in local recurrence in a high percentage of instances in which microscopic involvement of the adjacent structure could not definitely be demonstrated. In only the above mentioned two cases was the fixation on a strictly inflammatory basis. This would strongly suggest that anti-inflammatory roentgenotherapy when administered as a preoperative measure in badly infected lesions should not change the originally indicated extent of procedure even though the amount of fixation might be appreciably lessened.

Among the various structures removed were included a portion or all of the female genital tract in 23 instances, a portion of the male genital tract (prostate and seminal vesicles) in 8, a portion of the bladder or ureter in 5, a segment of small bowel in 4, a sizable portion of the abdominal parietes in 5, a segment of femoral nerve in 1, and the common iliac artery and vein in 1, the external iliac artery and vein in 1, and the common iliac vein alone in 1. These groups are individually too small to make any comparisons as to varying prognosis when one or another structure is involved but it is felt that as larger numbers are reported differences in outlook will become apparent based on differences in the additional lymphatic networks concerned. Our limited experience to date suggests that the ability of the several adjacent anatomic structures to resist invasion by the bowel tumor does vary, however. In eight patients presenting firm fixation to the prostate, actual involvement of that gland was present in only two. It seems likely that the prostatic capsular fascia is largely responsible for this resistance to prostatic invasion. By contrast, successful invasion of the vagina had occurred in 10 out of 16 instances in which it was removed.

Among the 42 cases there were 8 postoperative deaths, an operative mortality of 19 per cent. Of these, 1 occurred as a result of shock, 1 as a result of uremia 4 days postoperative, following resection of a portion of ureter with ligation of its proximal end rather than reimplantation, 1 following a second operation 12 days postresection for the relief of intestinal obstruction, and 1 occurred as a result of necrotizing arteritis of the common iliac artery, established at autopsy, 16 days after resection for a lesion complicated by a large lateral pelvic wall abscess. There were two deaths from large pulmonary emboli, confirmed at postmortem examination, 4 days and 3 weeks, respectively, after operation and two deaths from general inanition irremediable by any means with terminal pneumonia 2 and 5 weeks postoperative, respectively. The death from uremia was the only one directly attributable to the extent of the procedure, though there is little doubt but that such extension was a contributing cause in the others.



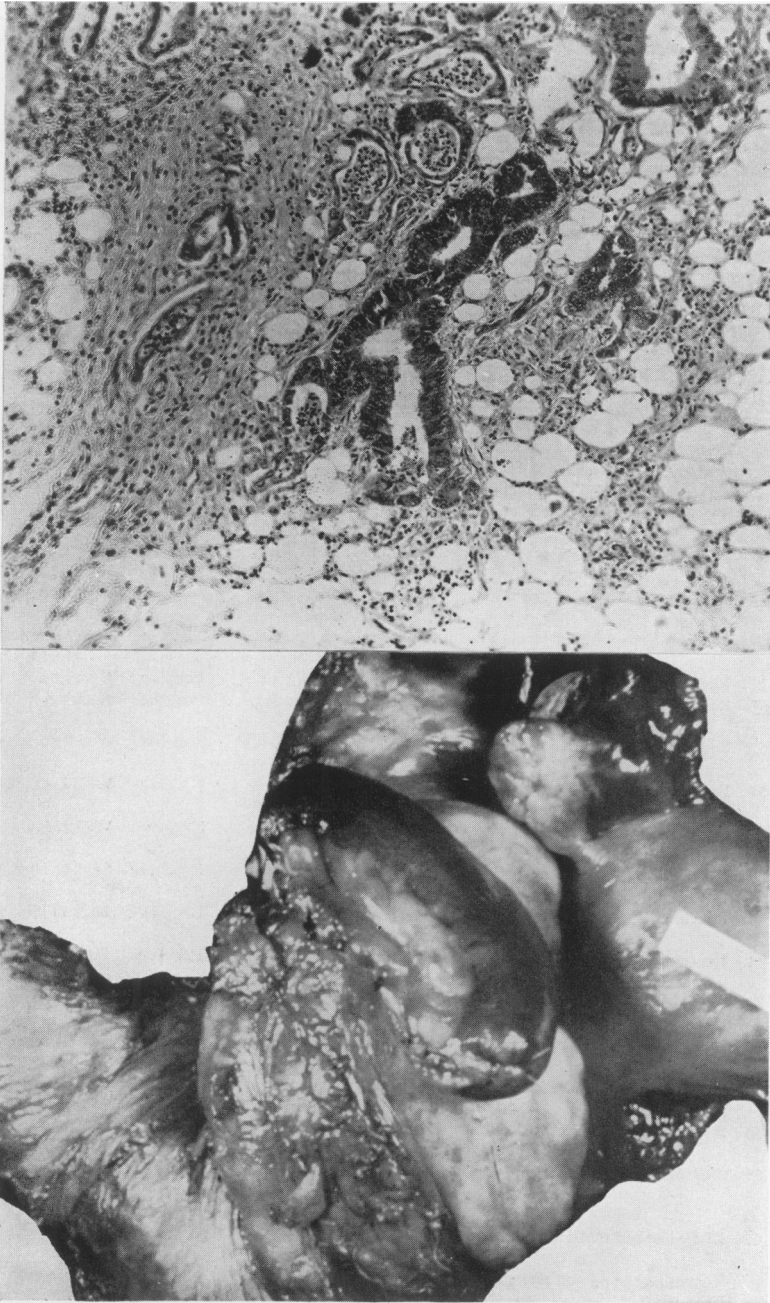


FIG. 5.—(Case 3452) : Uterus, tubes, ovaries and loop of ileum adherent to rectal specimen. Though there was no demonstrable invasion of these structures microscopic invasion of the extracolic fat would indicate the danger of dissecting them off.



TABLE II

TABULATED CASES OF LARGE BOWEL RESECTION ACCOMPANIED BY THE REMOVAL OF ADDITIONAL STRUCTURES

Case No.	Age	Location of Tumor	Operative Procedure	Structures Removed	Demonstrable Involvement of Other Structures	Subsequent Course
1783	69	Lower rectum	Miles' resection	Post. vaginal wall	Positive	Died 22 mos. postop.
2090	34	Lower rectum	Miles' resection	Post. vaginal wall	Positive	Metastases 53 mos. P.O.
2095	45	Rectum	Miles' resection	Post. vaginal wall	Negative	Well 4.5 years
2242	56	Rectum	Miles' resection	Post. vaginal wall	Negative	Recurrence & metas. 43 mos. P.O.
5016	62	Lower rectum	Miles' resection	Post. vaginal wall	Negative	Pulmonary metas. 15 mos. P.O.
5448	61	Rectum	Miles' resection	Post. vaginal wall	Negative	Well 18 mos. P.O.
5854	72	Rectum	Miles' resection	Post. vaginal wall	Negative	P.O. death 2 wks. inanition & pneumonia
5431	69	Low sigmoid	Miles' resection	Left ovary and tube	Negative	Well 1 year P.O.
1828	64	Rectosigmoid	Miles' resection	Cervix	Negative	Died 22 mos. P.O.
2958	55	Rectosigmoid	Miles' resection	Uterus, tubes, ovaries	Negative	P.O. death, shock
3774	31	Rectosigmoid	Two-stage Lahey	Uterus, tubes, ovaries	Negative	Well 3 years
6145	43	Rectosigmoid	Miles' resection	Uterus, tubes, ovaries	Negative	Well 5 months
2688	71	Rectum	Miles' resection	Uterus, tubes, ovaries, post. vaginal wall	Positive	Well 40 months
2811	65	Rectum	Miles' resection	Uterus, tubes, ovaries, post. vaginal wall	Negative	Well 33 months
3056	59	Rectum	Miles' resection	Uterus, tubes, ovaries, post. vaginal wall	Positive	Died 8 months P.O.
3500	65	Rectum	Miles' resection	Uterus, tubes, ovaries, post. vaginal wall	Positive	Well 39 months
5849	17	Rectum	Miles' resection	Uterus, entire vagina	Positive	Recurrence 13 months
6173	67	Rectum	Miles' resection	Uterus, tubes, ovaries, entire vagina	Positive	Recurrence 13 months
6686	62	Rectum	Miles' resection	Uterus, tubes, ovaries, entire vagina	Positive	Well 8 months
6715	37	Rectum	Miles' resection	Uterus, tubes, ovaries, entire vagina	Positive	Well 7 months
504	57	Rectum	Miles' resection	Retrourethral prostate and seminal vesicles	Negative	Well 52 months
1670	66	Rectum	Miles' resection	Retrourethral prostate and seminal vesicles	Negative	Suicide 10 months
2252	34	Rectum	Miles' resection	Retrourethral prostate and seminal vesicles	Negative	Died of disease 33 mos.
2534	61	Rectum	Miles' resection	Retrourethral prostate and seminal vesicles	Positive	P.O. death 12 days, intestinal obstruction
3102	68	Rectum	Miles' resection	Retrourethral prostate and seminal vesicles	Negative	Died 3 months
3582	58	Rectum	Miles' resection	Retrourethral prostate and seminal vesicles	Negative	Died 7 months
5865	50	Rectum	Miles' resection	Retrourethral prostate and seminal vesicles	Negative	Well 17 months
7298	63	Rectum	Miles' resection	Retrourethral prostate and seminal vesicles	Positive	Well 2 months
3296	55	Sigmoid	Resection— anastomosis	Posterolateral bladder wall + common iliac vein	Positive	Died of recurrence 39 mos. P.O.
3751	45	Rectosigmoid	Miles' resection	Entire post. bladder wall	Negative	Died of recurrence 8 mos. P.O.
5498	70	Rectosigmoid	Two-stage Lahey	Entire post. bladder wall	Positive	Well 18 months later
2579	58	Low sigmoid	Resection— anastomosis	Segment of ileum, left tube and ovary	Positive	P.O. death, uremia
3019	48	Rectosigmoid	Miles' resection	Segment of ileum	Positive	P.O. death (embolus)
3452	48	Rectosigmoid	Miles' resection	Segment of ileum, uterus, tubes, ovaries	Negative	Alive and well 3.5 years later

TABLE II (Continued)

Case No.	Age	Location of Tumor	Operative Procedure	Structures Removed	Demonstrable Involvement of Other Structures	Subsequent Course
7207	59	Low sigmoid	Hartman resection	Segment of ileum and bladder	Positive	P.O. death 2 wks.—wound hemorrhage
7223	59	Cecum	Right colectomy (Mikulicz)	Right ext. iliac artery & vein + segment right ureter	Positive	P.O. death (embolus) 3 weeks
2023	78	Cecum	Right colectomy with anastomosis	Large area ant. abdominal wall	Positive	P.O. death 5 wks. in-anition
3135	58	Right colon	Right colectomy with anastomosis	Iliopsoas muscle (entire)	Negative	Died 23 months later
4921	55	Right colon	Right colectomy (Mikulicz)	Large segment ant. abdominal wall + iliac muscle + femoral nerve	Positive	Well 28 months
5022	68	Splenic flexure	Resection	Entire wall to skin	Negative	Well 24 months
6192	72	Sigmoid (recurrent)	Miles' resection	Large area of anterior abdominal wall	Positive	Well 1 year later
7744	72	Rectum	Miles' resection	Posterior vaginal wall	Positive	Very recent

Fifteen patients are dead of, or are living with, recurrent or metastatic disease. The remaining 19 are alive and apparently well. Two of these have lived from 4 to 5 years, four from 3 to 4 years, three from 2 to 3 years, five from 1 to 2 years and five less than one year since operation.

COMMENT: That these extensive procedures are worth while is attested to by the fact that evidence of spread beyond the local lesion was absent in 41 per cent of cases and that a fair number of these patients have already survived for considerable periods. It is hoped that additional reports of similar series of cases will be forthcoming so that as the numbers increase a better appraisal of these extended resections may be obtained than is at present available, first regarding the entire group and second regarding the resection of the individual structures above mentioned. For example, it is suggested that coincident resection of abdominal wall or vagina will prove to be far more advantageous than removal of iliac vessels or the bladder. Involvement to the serosa in 79 per cent of patients in whom resection of the bowel alone was accomplished suggests the advisability of resecting adjacent attached structures more frequently with less indication than marked fixation to them as has usually been true in the past. It is conceivable that more cures will result from such a course than from resecting adjacent organs in which direct invasion is demonstrable. The treatment of cancer of the colon and rectum has been considerably clarified in recent years.<sup>1</sup> The justification of and indications for the coincident removal of additional structures remains, however, as one of the unsolved aspects of the problem in which further enlightenment is needed.

## SUMMARY

(1) As a result of a tendency toward increasing radicalism in dealing with carcinomas of the large bowel, more frequent attempts are being made to remove tumors which are definitely, or are suspected of invading adjacent structures.

(2) Forty-two such cases in which additional organs were removed in order to accomplish removal of a rectal or colonic cancer are presented.

(3) The poorer general condition of these patients, as well as the increased extent of the operations, as compared to the usual types of colon resection is reflected in an appreciably higher operative mortality.

(4) Justification for such procedures is indicated by the fact that apart from involvement of all layers of the bowel wall, other unfavorable pathologic signs were absent in 41 per cent of the cases and by the fact that 19 of 34 patients surviving operation are still living for considerable periods.

(5) It is suggested that the reporting of more such cases will contribute to a much needed clarification of the indications for these extended resections.

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